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ABSTRACT

This essay describes the struggle to maintain access to significant research and scholarship at a time when both the volume and price of information have increased nearly three-fold in the last decade. The discussion, which is derived from a roundtable of presidents, chief academic officers, university librarians, and policy and legal experts, examines the cultural, economic, and sociological aspects of this problem by highlighting the ways in which administrative, faculty and library cultures and capacities conflict. Strategies proposed as solutions include: (1) changing traditional conceptions about faculty and research by emphasizing quality over quantity of work, thus reducing the amount of publishing required for academic career advancement; (2) making universities better, more efficient consumers of academic materials; (3) educating faculty about the economics of the problem as it relates to copyright and publication and providing practical steps that faculty themselves can take to lessen problems in this area; (4) investing in electronic forms of scholarly communication; and (5) decoupling publication and faculty evaluation for the purposes of promotion and tenure. (MAB)

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SPECIAL ISSUE

POLICY

PERSPECTIVES

Co-sponsored by the Association of Research Libraries,
the Association of American Universities,
and the Pew Higher Education Roundtable

To Publish and Perish

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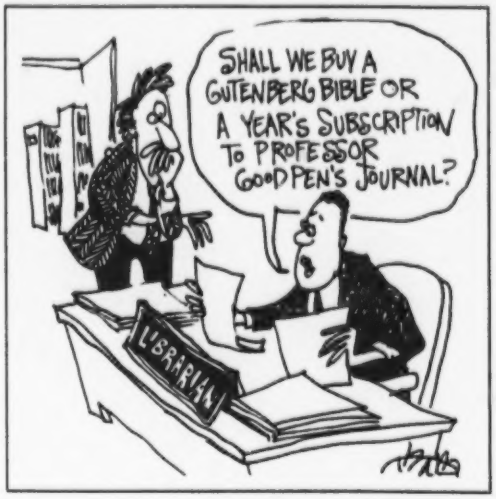

While every journey begins with a first step, some travelers have more trouble getting started than others—indeed for some, the challenge lies in neither the journey nor its completion, but in its contemplation and preparation. For two decades the leaders of America's universities and colleges have sought relief from the growing costs of providing access to an ever-expanding volume of scholarly output. What they have learned is that, however straightforward the problem appears, the path to resolution has come to resemble nothing so much as a rumba: two steps forward, three steps back, one to the side, twirl, and repeat.

This *Policy Perspectives* is about the challenge of maintaining access to significant research and scholarship at a time when both the volume and price of information have increased nearly threefold in the last decade alone. It is a challenge that confronts all of higher education, but nowhere is the dilemma more acute than in the nation's research universities and their libraries. Our essay derives from a roundtable of presidents, chief academic officers, and librarians of major research universities across North America, in addition to policy and legal experts, leaders of scholarly organizations, and heads of academic publishing centers. The roundtable was hosted by Johns Hopkins University and convened jointly by the Association of Research Libraries, the Association of American Universities, and the Pew Higher Education Roundtable. Funding for the roundtable was provided by the W. K. Kellogg Foundation, The Pew Charitable Trusts, and the Gladys Krieble Delmas Foundation.

"It's the Library's Problem"

The descriptive handle that most readily attaches to the rising cost of scholarly publication is "the library problem"—a seemingly permanent imbalance between the funds accorded to research libraries and the volume of scholarly output these libraries are expected to purchase and manage. Research libraries that once sought to support an array of specialties within and among academic disciplines now find it necessary to ration their purchases of monographs and subscriptions to journals. While a university library could once build a powerful collection to support its faculty's research and teaching, most must now settle for inadequate assemblages that exist at the intersection of what scholars deem critical and librarians judge they can afford.

In chilling outline, David Shulenburger, Provost of the University of Kansas, calibrates the problem. Between 1986 and 1996, the consumer price index increased 44 percent. Over that same decade, the cost of monographs increased by 62 percent. The price of health care increased by 84 percent. And the cost of scholarly journals increased a whopping 148 percent—more than three times the rate of inflation and nearly twice the rate of growth in health care costs. The price of subscriptions to

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online databases grew even more rapidly, in the most notorious case by over 350 percent in a single year. As David points out, "Our budget would have to increase 70 percent if we were to buy the same proportion of serials and monographs as we did in 1986. Due to inflation in price and in publications available, we would need an acquisitions budget . . . 2.5 times that of our existing acquisition budget."

Such increases have compelled the attention of those most responsible for library budgets: provosts and library directors. In these circles it is well-understood that the age in which a single research collection might lay claim to comprehensive coverage of even the most important work has ended. The growth in costs has brought a change to the mindset in which the number of volumes or serials maintained could be the simple mark of prestige among libraries.

The concurrent growth in the quantity and the cost of scholarly publication, however, is old news; the phenomenon has been described and analyzed in conference after conference, report after report. The simple and obvious solutions have been initiated, and some local benefits have accrued as a result: limits on the scope and depth of acquisitions, partnerships that promise a more effective sharing of resources among libraries, regional buying groups for the purpose of subscribing to electronic information resources.

While libraries have reduced acquisitions and extended cooperative agreements with other libraries, there has been no change in the larger pattern of cost escalation, no widely embraced strategy for reversing the trend. Prices are neither lower nor stable. Commercial publishers have made up in price what they have lost in volume, having understood that where demand for their product is strong, the pressure on libraries to maintain currency in a field will continue regardless of price. For-profit publishers have also understood that in most universities those who exert primary influence on acquisition decisions are not the ones bearing the direct cost of those acquisitions.

Members of university faculties who contribute to a particular domain of study expect, as a matter of course, their libraries to carry those journals that are their own acknowledged channels of discourse. From this perspective, a several-fold increase in the price of a journal subscription is scarcely an issue—any more than a rise in the cost of health care insurance is an issue for someone accustomed to full coverage from an employer. To those within a discourse community, the increased cost of publication has no bearing on the value of sustaining a free and open exchange of information. Meeting an increase in acquisition costs is quite literally "the library's problem."

The underlying issue is the disjunction between the sociology and the economics of academic publication itself—the processes through which the research community disseminates knowledge and judges the quality of work produced by its members.

"A Gift Exchange Society"

Universities and colleges find themselves trapped between the expectations of their faculty, who often consider the work of research and scholarship as essentially a free good, and the market strategies of commercial publishers, who understand how valuable these commodities are to the workings of the academy. To focus on the "library as the problem," however, is to confuse symptom and disease. The underlying issue is the disjunction between the sociology and the economics of academic publication itself—the processes through which the research community disseminates knowledge and judges the quality of work produced by its members.

Academic publication accomplishes four objectives of critical importance to universities and colleges: the certification, dissemination, indexing, and archiving of research and scholarship. Publication both advances the state of knowledge within a domain and provides the mechanism to assess the quality of contributions that individuals make to a discipline. Publication is understood to be the pri-

mary channel through which individual faculty demonstrate their worthiness for tenure, promotion, grants, and fellowships. The peer review mechanisms that underlie the decision of any publisher to accept an article or full-length manuscript help to certify the value of any given contribution as well as contributor to the field.

What gives this enterprise its peculiar cast is the fact that the producers of knowledge are also its primary consumers. In most fields the market for scholarly publication is driven largely by the internal mechanics of a culture, in which further specialization increases greatly the volume of published work at the same time that individuals come to read more narrowly within their fields. For the faculty of a university or college, the act of publication constitutes what many have termed a "gift exchange" among a community of devotees bound by a common interest; the giving of such gifts is intended to win the regard of other members of the community. Any personal gains from the publication of research are the result of the positive esteem an article or book receives in its field of inquiry. Superior achievement is gauged not by the volume of sales but by the number of research citations, the approbation of peer review, and the prestige of the journal in which an article appears. The personal rewards of significant accomplishment accrue indirectly in the form of promotion and tenure within one's home institution, the awarding of grants and fellowships, or the appearance of attractive offers from other institutions.

However logical in its own right, the operations of a gift exchange society create an environment in which individual producers of knowledge experience none of the direct consequences of market failure. Those contributors to a knowledge base who are faculty of universities or colleges expect their institutions to provide the current information that makes possible their own engagement in a field. The premise that a university and its library should provide access to all or most materials that support its faculty's research derives from an academic culture of some 30 to 40 years ago, when the volume of published material was smaller, the cost of acquiring such material was lower, and the resources available to institutions to accomplish their objectives were proportionately greater in what is now nostalgically recalled as a golden age. If the resource base of research universities has grown in real terms since that time, the demands on those resources have grown at an even faster rate. Yet the expectation that many faculty members exert on their institutions continues to be that "the institution will provide," regardless of cost, regardless of changes in the circumstances of academic publishing. It is not an unreasonable expectation from the faculty's perspective. But given the market forces that now shape the economies of universities and colleges, the unreasonableness of the expectation from the institution's point of view becomes more apparent.

Of Prices and Profits

It is also an expectation whose most immediate roots derive from the 1960s and 1970s, when enrollments were growing, the Cold War prevailed, federal money flowed in abundance, and the number of higher education institutions aspiring to research status was increasing. As institutions of higher education increased the size of their faculties to accommodate a growing market for their missions, the quantity of research came to exceed the capacity of the scholarly publishing apparatus as it then existed. Recognizing a bottleneck, commercial publishers came to absorb an increasing share of the market, with the broad support of higher education institutions, scholarly societies, and faculty who served as editors, reviewers, and members of editorial boards. Consigning the production and distribution functions of publication to the commercial sector purchased an immediate increase in capacity: existing journals expanded, and new journals were formed to accommodate a growing quantity of research in increasingly specialized domains.

Initially these arrangements with commercial publishers worked well. Individual scholars gained an increased number of outlets for the dissemination of their work; universities and scholarly organizations found themselves relieved of a set of production activities they were not well-disposed to perform; and commercial publishers gained a new client base to augment their business. In the dance with newly expanded opportunity, the movement to commercialize the process of scholarly communication looked like a real step forward.

It wasn't. The true winners were in fact the commercial publishers. Universities found themselves taking two steps back, reeling in the grip of rising prices from an industry that shared few of their fundamental values. While members of university and college faculties regarded publication as an exchange of free goods, the handful of publishers who were coming to control access to and utilization of intellectual property saw opportunity for enlarged profits. The principle of requiring authors to assign copyright to a publisher had been standard even before commercial publishers had come to control so much of the industry. Because they do not conceive of the publication as providing direct financial benefit to themselves or their institutions, most scholars seeking the publication of their research have willingly agreed to what, on the surface, appears an inconsequential stipulation.

In the heady days of rapid expansion of both institutions and funded research opportunities, neither institutions nor their faculties fully understood what was at stake when establishing—or rather declining to establish—rules concerning the copyrighted work that faculty produce using university facilities and university personnel.

But the result is that universities and colleges, having made an initial outlay in the form of salaries and infrastructure to support faculty research, are then forced to pay exorbitant prices for the editing, production, and distribution functions that commercial publishers perform. While part of this latter expenditure covers legitimate costs of publication, the fastest-growing portion consists of the margin commercial publishers seek as profit. The constraints to the flow of scholarly information result not just from prohibitive pricing but from the restrictions that commercial publishers seek to impose on the kind of use an individual faculty member can make of his or her own published work.

The need to attain greater control of the intellectual property produced by their own faculty is now well-understood by the leadership of most research universities. Equally clear is the enormity of the task, as it is much harder to reclaim something given away than to assert ownership in an unsettled domain. The commercial publishing industry, which itself has become increasingly concentrated as well as more profitable, brings considerable advantages to the contest: substantial financial resources, a willingness to press its case in court, and extensive control of the most prestigious academic publishing outlets. The most obvious strategy available to universities—a boycott in the purchase of excessively priced journals published by commercial entities—simply won't work; universities and their faculty would have substantially more to lose than the publishers in any prolonged stand-off. Charged with trying to subvert the flow of ideas and information, university leaders would likely find faculty aligning themselves with their publishers and against their administrations.

The broader lesson is that the ripest moment for creating a system of scholarly discourse in printed form that might serve institutions and their faculty in a fair and cost-effective manner occurred some 30 years ago. At that time universities might have exercised a stronger hand in shaping the publication system and the disposition of rights to intellectual property created on their own campuses. To do so, however, universities would have had to lay claim to the scholarly output of their faculties, particularly that output underwritten by the grants awarded to the universities—a claim they shied away from then, but came to assert in the 1980s, when the issue was the ownership of patents on inventions developed by faculty. In considering what might have been achieved in the case of copyright, it is interesting to note what it took to succeed in the case of patents. In the latter, universities followed a dual strategy—providing the technical help their faculty needed to acquire and market their discoveries, while insisting that they had a financial stake in the returns on research conducted in university facilities by fully-employed university personnel. While the performance of institutions in the handling of patents has not been flawless, faculty by and large have perceived the services provided by

the offices of technical assistance as a boon, and they have considered the new patent policies both fair and profitable. A clear understanding of the role that institutions played in supporting the research of their faculty yielded a logic of mutual benefits.

No such logic prevailed in the case of copyrights. The objective in the domain of copyright is not so much to share financial gains as to protect intellectual property from commercial exploitation to the detriment of both institutions and their faculty. In the heady days of rapid expansion of both institutions and funded research opportunities, neither institutions nor their faculties fully understood what was at stake when establishing—or rather declining to establish—rules concerning the copyrighted work that faculty produce using university facilities and university personnel. Missed was not the value of the blockbuster textbook or best-selling monograph, but the value of the scholarly articles that were becoming the staple of the research enterprise itself. While the faculty rightfully protected the former, both faculty and institutions gave away the latter, having accepted publishers' tacit assurances that, in exchange for the assignment of copyright, they would undertake the broadest possible dissemination of scholarly research.

Regaining the Initiative

What is required now is an effective set of strategies, based in part on the lessons of the past, in part on a tough-minded understanding of the market for academic publications, and in part on an appreciation of the possibilities presented by electronic publishing. Starting that process begins with five initiatives—none of them easy, none sufficient in itself, and each requiring time and a broad coalition of efforts among higher education institutions, scholarly organizations, and faculty, whose active collaboration is essential to realizing institutional commitments. To achieve progress on any initiative entails a willingness to recast how research results are communicated and the means by which the producers of those results are evaluated.

1. ***End the preoccupation with numbers.*** The first requirement is a fundamental disentangling of the notions of quality and quantity. The habit of mind that requires "32 articles" to be included in a tenure portfolio is one that stretches the essence of a candidate's contribution so thin as to make its real value scarcely discernible. It is also a custom that encourages greater specialization of publication, thereby reinforcing the power of commercial publishing.

The first step would be for faculty personnel committees to make clear that the quality of work accounts for more than the sheer number of articles and papers submitted for promotion and tenure. Were there only, say, four or five entries—those which had appeared in the most highly regarded venues, representing the candidate's and the department's judgment of his or her very best work—members of the committee could reasonably be expected to read in detail each publication, forming an independent judgment of its worth. Such an arrangement would help to focus the process of judging the work of single scholars in any discipline. Limiting the number of entries would also help solve the problem of multi-authorship, when the candidate's work is subsumed within the production of a large research team; in such instances the candidate could submit articles concerning only those parts of the research project in which he or she played a central role. Paring back the emphasis on quantity would create more time for junior faculty and researchers to develop truly unique contributions.

2. ***Be smart shoppers.*** Research libraries, by the same token, need to continue along their course, graduating from a mindset that accords status and prestige by "the tonnage model"—the sheer number of volumes and journal subscriptions a single collection contains. Universities and colleges are coming of necessity to discover that "the best libraries are agile ones"—those in which the principles of selectivity have been applied to build a collection of distinctive value that can support well-defined lines of inquiry. Research libraries must come to make even more pointed decisions about

which materials and information resources they can afford to access and deliver. If the answer is instead a bigger library budget, then the faculty must be central to the process of deciding which budgets are to get smaller.

Ultimately, research libraries, in conjunction with their host institutions and faculty, must work together to shape a broader, more coherent market for scholarly materials and resources, whether in printed or electronic form. Universities and colleges must proceed beyond the notion of themselves as independent consumers of scholarly research; they must act upon those values that define all libraries and their faculties as members of a single market for new knowledge and understanding. The cooperative efforts that have given rise to regional buying consortia among libraries must be extended, leading to broad-based national and international buying collectives. The consolidation of printed-volume purchases and the volume discounts that result from group subscription to electronic information resources have yielded a notable increase in buying power for libraries that have worked together as regional collectives. The leverage from such linkages can only increase as the range of cooperation among libraries expands. The $680 million that research libraries in North America expend annually in acquisition can exert a powerful shaping influence on the market for scholarly information—but only to the degree that individual libraries work together to articulate and achieve their common goals.

3. ***Get a handle on property rights.*** Most faculty members understand that the economic value of research results lies not so much in the fact of publication as in the stature and hence market position that a consistent history of publication brings to an individual. To the extent that further research depends on reasonable access to previously published work, individually and collectively faculty must learn that "the library problem" is their problem as well. Indeed, to the extent that members of a faculty—and not simply the librarian or senior administrators—come to decry the drain on institutional resources posed by the escalating costs of scholarly acquisitions, the likelihood of embracing alternatives to the current system of academic publication increases.

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Here the requirement is a well-organized campaign to inform faculty of the new economics of scholarly publication. A decade ago the Association of American Universities (AAU) organized precisely such a campaign to help faculty understand the economics of indirect cost recovery. At that time the Office of Management and Budget was mounting an aggressive campaign to roll back the costs universities could recover for the facilities and administrative effort they devoted to sponsored research. Research universities found themselves pressured both from within and without, as their faculties joined in the campaign against what they saw as excessive indirect cost rates that were diverting research funds to administrative purposes.

The AAU's answer was an extraordinary effort to educate faculty, particularly those in the fields of science and engineering. In seminars, campus roundtables, and meetings with individual and small groups of faculty, the economics of cost recovery were laid out. The message was clear and consistent: legitimate costs not covered by the sponsoring agency would have to be met out of the university's unrestricted revenue. Most faculty came to appreciate that they too benefited when indirect costs were fully recovered, and that they had a vested interest in a system whose funds maintained the infrastructure that supported their own work. In the universities' effort to preserve the principle of full indirect cost recovery, these faculty became important allies, helping the universities make their case in Washington and elsewhere.

As faculty came to understand the problem, they became agents of a solution—a lesson that now needs to be applied to the question of copyright and publication. Again, what is required is a

consistent, well-organized, broadly conceived campaign laying out the economics of the problem and the practical steps faculty themselves—including those in the humanities and social sciences—can take to help effect a solution.

A successful education campaign would result in faculty themselves coming to affirm that the funds that their institution must devote to the acquisition of increasingly expensive published materials is really a diminishment of funds available to support their own research and teaching. Just as important, a successful educational campaign would help faculty to understand that they have real options when assigning the copyright to their research—options that can preserve both their own and their institution's interests. There may in fact be instances when the transfer of copyright to a publisher is appropriate, when the publisher's margins are small or the publisher is an academic press or a learned society of limited means. It is unrealistic to expect that any publisher will simply relinquish all claims on copyright. The point is that faculty not sign away all components of the copyright without understanding what is at stake. At a minimum, individual faculty should seek to retain the right to distribute their published work for purposes of teaching or for sharing with colleagues within the institution or the academic field. Several institutions have shown leadership in spreading that message to their faculty, including Duke, Johns Hopkins, the State University of New York, and California State University. It is a perspective that ought to be expanded to include all AAU campuses and beyond in an organized effort resembling the earlier initiative to teach faculty the economics of indirect cost recovery. AAU is well-positioned to direct such a campaign, working in conjunction with the Association of Research Libraries and scholarly organizations.

4. ***Invest in electronic forms of scholarly communication.*** Now is the time to get right for electronic publishing what the scholarly community got so wrong in the case of print publication. The Internet is bringing about a steady and fundamental change to the process of scholarly communication—a change occasioned less in the interests of cost than of time and convenience. Most researchers are avid users of e-mail. Increasingly they post preliminary accounts of their work on private Web sites for review and comment by a circle of colleagues in the field. Within a handful of traditional disciplines, most notably physics, postings to public Web sites are also becoming a standard form of collective communication.

This push for electronic forms of scholarly communication reflects, on the one hand, the growing power of the Internet and, on the other, a search for more timely and convenient means of announcing and certifying new research results. Such findings typically take far too long to review, edit, and produce in printed form. The first breakthrough was the copy machine, which allowed reasonably inexpensive distribution of working papers and draft articles to an expanding number of colleagues. Principal researchers quickly discovered that if they learned of a major finding by reading its formal presentation in a scholarly journal, it probably meant they were not "in the loop." The Internet dramatically increases both the speed and the audience for this kind of initial circulation. Post a working paper or a draft on the Internet, either before or during the time it is being reviewed for publication, and its potential impact is instantaneous. Particularly in the sciences, it is only a slight exaggeration to say that by the time a piece of work reaches the printed page its greatest research impact has already occurred, and its remaining value is primarily archival.

Particularly in the sciences, it is only a slight exaggeration to say that by the time a piece of work reaches the printed page its greatest research impact has already occurred, and its remaining value is primarily archival.

The obvious problem with postings to the Internet is the unruly nature of a communications channel in which the attributes of tangibility, permanence, quality, and authority are all notably absent. For most researchers, the printed page connotes an accomplishment of lasting value, more so than any image on a computer screen or data con-

signed to a disk. However pure and incorruptible the digital environment may seem in theory, its dependency on equipment that can break down or grow obsolete gives rise to skepticism about its suitability for the permanent archiving of scientific or scholarly achievement.

No venture into a different system of communication can gain the support of the academic community unless it provides a mechanism for denoting what peer review determines to have greater or lesser importance to a field.

Beyond the factors of tangibility and permanence, an environment of purely open, undifferentiated electronic communication does nothing to certify the value of individual contributions to a field of inquiry. No venture into a different system of communication can gain the support of the academic community unless it provides a mechanism for denoting what peer review determines to have greater or lesser importance to a field. A key role of the scholarly publication process in its current form is to distinguish work that is correct and helpful from that which significantly advances the state of understanding.

Electronic publication without mechanisms of peer review and certification will be all noise and precious little light. We believe that the agencies best positioned to make the Internet serve the purposes of an orderly process of scholarly communication are the scholarly and disciplinary organizations, which have traditionally performed that role for the publication of printed research results. Many scholarly journals, despite their increasingly commercial cast, have editorial and review processes that are the responsibility of the sponsoring scholarly society or association. We believe that the World Wide Web sites of these scholarly and disciplinary organizations ought to play a major role not just in the dissemination of important work within the field but in the certification of quality as well.

One scenario would have these organizations making their Web sites venues for the reporting of research findings. We could conceive of there being three levels of entries for a given organization, each conferring a greater measure of certification. At their first level, such Web sites would become places for open postings for which there were standards of presentation and citation, along with a full listing of the authors' credentials. The site would indicate to users that the postings at this level had not been subject to formal review and, as such, had not yet earned the organization's seal of approval. What would likely appear are drafts containing early results and first findings. A second level would present results that had been reviewed and hence accepted for electronic publication. Finally, the site would offer a limited selection of papers and reports the review panels had deemed as having particular significance. Each year the organization might also publish a printed volume containing papers with this designation which had appeared initially in electronic form.

This notion of multi-leveled Web sites and subsequent print volumes would open up the process of communication, while preserving and even strengthening the certification functions scholarly and disciplinary societies are expected to perform. Such a system would not be without costs. One of the benefits universities and colleges receive from the current system of peer-reviewed print journals is a reliable means of assessing the contributions of their faculty; these institutions pay for this service indirectly through subscriptions to the journals themselves. If this new form of electronic publication ultimately reduces the number of traditional print journals, a significant portion of the savings to the universities' and colleges' library budgets would have to be spent on the membership and postings fees that scholarly and disciplinary organizations would need to charge in order to operate their refereed Web sites.

The major challenge is simply getting started. The AAU has created a standing Committee on Digital Networks and Intellectual Property, chaired by Stanford's Gerhard Casper and composed of presidents, provosts, librarians, and other senior

officers of AAU institutions. The committee's charge is to focus on issues, legislation, and regulatory policies pertaining to intellectual property in the medium of electronic publication. The committee exemplifies the kind of collective effort that will be required to build an environment for electronic publishing that is conducive to the needs of the scholarly enterprise—and that decreases the dependency of that enterprise on a commercial market whose escalating prices are restricting access to scholarly publications. The AAU has also established a task force on decoupling certification from publication, while the Association of Research Libraries (ARL) with the support of the AAU, has launched the Scholarly Publishing & Academic Resources Coalition (SPARC)—a partnership project enlisting the efforts of higher education institutions, libraries, scholarly societies, university presses, and other organizations to promote a more open and competitive market for scholarly dissemination through electronic publication and other means.

What is required from each of these efforts is a business plan—a statement of goals, strategies, infrastructures, and management systems needed to create a system of electronically mediated publications that will provide enhanced access to scholarly information and relief from the escalating prices of commercial publishers.

What is also required is a tough, no-nonsense discussion of the issue of electronic property rights. The solution ought to reflect the success during the 1980s in forging a compact between individual researchers and employing institutions for the distribution of patent income, rather than the drift of the 1960s and 1970s that yielded such unintended and unexpectedly costly results. Failure to act will have two consequences: a further escalation of acquisition costs and the loss of the opportunity electronic publication presents to help recast the economics of scholarly publication.

5. ***Decouple publication and faculty evaluation for the purposes of promotion and tenure.*** A final initiative addresses more directly the problem of expanding publications and escalating acquisitions costs. In part, the growth in the number of journals over the last two decades reflects the growing specialization of research fields, questions, and methods. As fields divide and then divide again, each new section establishes its own journal. Some of this growth is inevitable, as knowledge continues to expand and become more specialized. Much of the recent growth, however, has been occasioned by university and college personnel processes that make publication in peer reviewed journals the *sine qua non* for promotion and tenure. The more specialized the journal, the smaller its circulation, the more likely its function is that of an outlet to accommodate the work of a relatively closed network of individuals who, in the pages of their journal, speak principally to one another and to the personnel committees that judge them suitable for promotion and tenure.

Higher education institutions and their faculty are coming increasingly to realize the need to reconceive the process by which the scholarly community conveys advances in knowledge. An important means of denoting the quality and significance of research performed is the venue of publication—*where* a scholar's work appears. How many A journals? A- journals? B+ journals? However artificial such gradations may seem, they represent an important insight into how universities might change the way they assess the scholarly work of faculty. While the number of journals over the last two decades has grown substantially, the number of "leading journals" has remained relatively constant. If the purpose of scholarly publication was solely to extend the frontiers of knowledge, the total number of journals would not need to exceed greatly the number of "leading journals." The specialized information contained in the balance of what is now published could be easily disseminated as research papers, either electronically or otherwise.

The question inevitably asked is, "Who goes first?" Which major universities and which scholarly societies have the will, confidence, and financial resources to get the process started?

The commingling of publication with peer review for purposes of promotion and tenure produces information at a rate that far exceeds the capacity for consumption within the enterprise. In a world ruled by "publish or perish," what perishes first, it turns out, are trees and library budgets. Breaking this logjam requires disentangling—or what the AAU task force has termed "decoupling"—the processes of faculty evaluation and print publication.

We are calling for neither a lessening of the importance of research in the criteria for promotion and tenure nor a turning away from peer review as a means of evaluating the quality and importance of individual research achievements. Rather, what we seek is an alternate means of achieving those ends. The most promising ideas involve the separation of certification and dissemination, combined with the increased utilization of electronic publication and the Internet. We have already suggested as one possibility a partnership between the nation's leading universities and the scholarly organizations. An additional step—first proposed at a March 1997 conference sponsored by the California Institute of Technology—would be an explicit agreement among universities and colleges that appropriately managed certifications posted to Web sites would have equal weight with printed publications in promotion and tenure reviews. Scholars could submit major papers to either leading journals or the relevant scholarly society's review panel for certification and electronic publication, knowing in advance that, for purposes of promotion and tenure, the judgment of one was as valuable as the other.

The outcome we seek is a set of specific arrangements—linking institutions, their faculty, and their scholarly organizations—that protects the rights of faculty and secures for their appointing institutions a more assured ability to provide access to research and scholarly information.

We do not suppose that such a process would be without considerable costs of its own; this kind of arrangement would require investments in infrastructure and management systems. If such a transition does not reduce the absolute costs of scholarly certification and dissemination, it could nonetheless reduce the rate at which costs are currently growing. As we have already suggested, such a system would have to be funded largely by the fees paid by institutions, possibly augmented by page charges like those currently levied for publication in some fields. A system of this sort would enable the research community to convey new knowledge in forms that are more efficient, timely, accessible, and less dependent on the consumption of paper.

The notion of an electronically mediated peer review process as a full complement to journal publication is hardly a new idea—and again that's the rub. It is an idea that has few detractors and even fewer takers. The question inevitably asked is, "Who goes first?" Which major universities and which scholarly societies have the will, confidence, and financial resources to get the process started?

Our answer is simple and to the point. It is time for the presidents of the nation's major research universities to fish or cut bait. Collectively, they have both opportunity and motive—and, in the Association of American Universities, they have an organization with the capacity to convene the necessary negotiations. Working with the ARL and with other associations such as the National Association of State Universities and Land Grant Colleges, AAU could marshal the collective effort needed to effect enduring change. A second set of necessary players are the leaders of scholarly and disciplinary organizations; as arbiters of quality within their academic domains, their organizations bring to the table a faculty voice concerned with standards, with the certification of research results, and with the maintenance of open access to scholarly communications. A third set of necessary players consists of the review committees that determine the allocation of federal grants from such agencies as the National Science Foundation and the National Institutes of Health. Finally, any successful transition will require the support and participation of individual faculty

themselves—the men and women who ultimately drive the system.

The outcome we seek is a set of specific arrangements—a complex bargain, really, linking institutions, their faculty, and their scholarly organizations—that protects the rights of faculty and secures for their appointing institutions a more assured ability to provide access to research and scholarly information. The collaboration of research universities in developing the Supercomputer Alliance and Internet II provide important models of success. However keen the competition that exists among research universities in other domains, a combined effort on this front would benefit all institutions equally.

Stepping Forward

For the presidents, provosts, and library directors of the nation's research universities confronting the phenomenon of expanding publication volume and runaway acquisition costs, there is an exasperating familiarity to the issues raised and the solutions proposed here. It is not for want of discussion that the problem continues to intensify.

Why is there so little focused action to solve a problem so well understood? The answer lies in part with the fragmented nature of the academic enterprise, in part with the tenacity of the commercial entities that now exert disproportionate influence on the price of acquiring scholarly information, and in part with the suspicion of many faculty that they are likely to be deprived of substantial personal benefits as well as access to scholarly publications. The problem is also complicated by the fact that much of the important work published in the sciences and other fields is produced by researchers employed by industry, or by faculty of universities outside of North America, making a common course of action all the more difficult.

Taking note of these circumstances, some have proposed that the only practical solution to this problem is to take no action at all—to let the bubble of commercial exploitation burst itself, then to allow the market to identify a system of scholarly communication and certification that serves the needs of universities and colleges, their faculty, and their libraries. We think the risks of doing nothing substantially outweigh the difficulty of doing something—and doing it now! A moment of opportunity is at hand, occasioned by the potential for peer-reviewed electronic publishing and a sense of desperation spawned by runaway acquisition costs. Missing this opportunity will mean more rapidly accelerating costs, greater commercial control, and, in the end, less access to scholarly communications.

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